

United States Patent [19]

Petrak

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[54] METHOD OF IN SITU FABRICATION OF A
MONOLITHIC REFRACTORY LINING

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Related U.S. Application Data

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abandoned.

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[58] Field of Search 106/64, 104, 315;
260/30

[56]

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[57]

ABSTRACT

Method of preparing a batch of non-basic refractory
gunning mix for forming a refractory monolith on its
situs of use by mixing non-basic refractory aggregate
and calcium aluminate cement with from about 0.5 to
25%, on a cement basis, of calcium chloride hydrate
and mixing the resulting batch with water to allow
gunning.

4 Claims, No Drawings

RELATED APPLICATION

BACKGROUND OF THE INVENTION

Accordingly, it is an object of the present invention to provide improved methods of in situ fabrication of 55 monolithic refractory linings by gunning.

A plurality of batches of refractory mixture were prepared and size graded. The refractory aggregate contained as major components based on an oxide analysis, approximately 37% Al_2O_3 and 39% SiO_2 with small amounts of lime, titania, iron oxide, magnesia and alkalis. The mixes contained approximately 67% kaolin, 4% kyanite, 1% amorphous silica, 3% ball clay, 3% pyrophyllite and 22% calcium aluminate cement. To each of the mixes were added the varying percentages of calcium chloride hydrate shown in Table I below along with 5% predampening water except mixes J and K which contained 3.5%. Each of the mixes was gunned on a test panel and the results and physical properties are given in Table I below.

TABLE I

[illegible]

TABLE I-continued

MIX DESIGNATION	A	B	C	D	E	F	G	H	I	J	K
Panel Appearance:	Poor	Poor	Ripples	Good	Good	Good	Excel.	Excel.	Excel.	Excel.	Excel.
Panel Lime Content:	4.65	4.20	4.60	4.17	4.0	4.4	4.25	4.40	6.05		
Panel Chlorine Content:	0.0	0.1	0.1	0.1	0.1	0.1	0.3	0.6	1.23		
Physical Properties After Drying 18 Hrs. at 230° F											
Bulk Density, pcf (Av. 3):	138	134	132	132	127	125	127	130	138		
Modulus of Rupture, psi (Av. 3):	1130	1280	1070	1020	670	670	830	1000	890		
Cold Crushing Strength, psi (Av. 3):	5920	6330	3510	3910	1900	2930	3750	4460	5990		

The results above show that the addition of calcium chloride hydrate to refractory aggregate that is gunned on its situs of use materially reduces the rebound loss as compared to a gunned aggregate without the hydrate addition.

In another example, to a mixture containing 70% tabular alumina and 30% calcium aluminate cement was added 0.67% calcium chloride hydrate, based upon the weight of the cement, the mixture was predampened with 4% water and gunned on a panel. The rebound loss for this mixture was only 13% compared with a 35% loss for an identical mixture without the calcium chloride hydrate addition.

In another example, 70% fireclay was substituted for the tabular alumina in the above example. The mix was predampened and gunned on a panel and had a 13% rebound loss.

Mixes according to the invention may contain from about 5% to 50%, by weight, calcium aluminate cement and the balance refractory aggregate. However, it is preferred that the cement content range between about 10 and 35%, by weight.

The use of calcium chloride hydrate as a gunning aid accelerates the set of the cement and dispenses with the usual aging process.

Having thus described the invention in detail and with sufficient particularity as to enable those skilled in

the art to practice it, what is desired to have protected by Letters Patent is set forth in the following claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In a method of gunning refractory material on its situs of use with a minimum of rebounds to form a refractory monolith, which method includes the steps of preparing a refractory batch comprising non-basic refractory aggregate and calcium aluminate cement and tempering it, the improvement comprising mixing from about 0.5 to 25%, based upon the weight of the cement, of calcium chloride hydrate with the refractory batch and gunning the resulting batch.

2. The method of claim 1, in which the calcium chloride hydrate is present in amounts between about 0.5 and 15%, based upon the weight of the cement.

3. The method of claim 1, in which the refractory aggregate contains Al₂O₃ and/or SiO₂ as major components based on an oxide analysis.

4. A method of preparing a batch of non-basic refractory gunning mix for forming a refractory monolith on its situs of use comprising mixing non-basic refractory aggregate and calcium aluminate cement with from about 0.5 to 25%, based upon the weight of the cement, of calcium chloride hydrate and mixing the resulting batch with water to allow gunning.

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